

ANALYSIS OF WORKPLACE RISK ASSESSMENT DURING SURFACE EXPLOITATION OF MINERAL RESOURCES

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Abstract: The mining industry is a driving force of economic development, but this branch of industry is known as one of those with the most unfavorable working conditions, a large number of occupational injuries at work and the possible occurrence of collective accidents. This paper presents a risk assessment model with an occupational health and safety aspect in the process of extracting minerals by drilling. A key element of improving safety and working areas is the control and control of risks. Special attention must be paid to the risk assessment itself, which includes the identification of hazards, the probability of the occurrence of a dangerous situation, the analysis of the volume and level of unwanted events, the way possible situations unfold, and at the same time determining the sequence and order of procedures and measures that should be applied in order to eliminate or reduce the risk to a satisfactory level, i.e. to a level at which it can be controlled. The risk assessment model for the driller workplace is in accordance with the Occupational Safety and Health Act and the KINNEY Method. The model has been applied, checked and proven at the approved investigative sites during execution and inspection supervision in the territory of the Republic of North Macedonia.

Keywords: risk, drilling, assessment.

1. INTRODUCTION

Safety and health at work requires the creation of working conditions in which measures and activities are taken in order to protect the life and health of employees and other persons who have the right to do so. It is in the interest of society, of all business entities and of each individual to create the highest level of safety and health at work so that unwanted consequences such as injury at work, occupational diseases and diseases related to the workplace are reduced to the smallest possible measure. In order to achieve this goal, a systematic approach in preventive action and connection of all entities that bear certain obligations and activities at the national level and the international institutions in this area is necessary. (Harmonization of European legislation in the field of safety and health at work in the legal system of the Republic of North Macedonia, 2021, p.65). In order to achieve the goal of safety and health at work, it is necessary that the working conditions, the means of work as well as the organization of the work itself be adjusted according to the needs of the worker, and at the same time that the workers be motivated for active participation in all activities.

2. RISK

The term risk means a quantitatively expressed measure of the probability that, as a result of the exposure, harmful effects will occur on the health and life of the occupationally exposed workers. A hazard can be anything that has the potential to cause injury (work materials, equipment, work methods or practice), that's why risk assessment exists and helps us successfully manage the safety and health of workers. Modern production includes the use of equipment, machines and devices, the use of various harmful substances and hazards in the workplace and the working environment that lead to injuries and damages the health of employees.

Risk assessment is the most important element in reducing injuries at work and is the process of evaluating the risks to the health and safety of workers that cause hazards in the workplace.

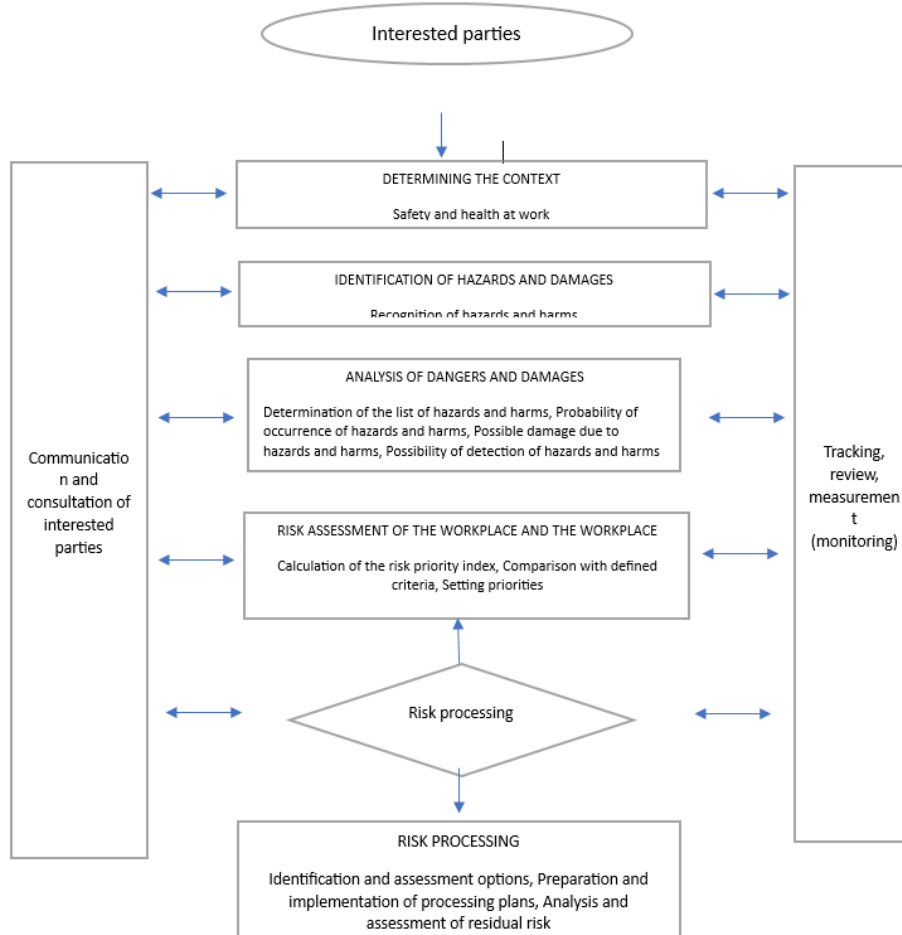
3. RISK ASSESSMENT

Risk assessment is the systematic recording and assessment of all factors of the work process in order to determine the possible types of hazards and harms in the workplace and the work environment that can cause damage to health, injuries at work, occupational diseases and diseases related to the work. Risk assessment can be described as a continuous cycle of improvement that can be implemented in the management processes of a company.

Figure 1 (block diagram) shows: Communication and consultation with internal and external stakeholders; Determination of the external, internal and context of the risk assessment; Identification of where, when, why and how some dangers and damages can be caused by the realization of the risks; Analysis of the existing controls of danger, damage, assessment of probability and consequences; Comparing the estimated risks with the previously

established criteria for acceptable risk; Risk processing - Risk processing - Preparation and implementation of specific cost analyses, strategies and development plans to increase the effectiveness and efficiency of the system: Monitoring and review - to increase effectiveness and efficiency, it is necessary to monitor the performance of all steps of the evaluation of the risk assessment. From the above, the most critical step is risk assessment. Poor risk assessment reflects poorly on preventive and corrective planning, in order to achieve an efficient system for managing health and safety at work.

Figure 1. Block Diagram of the risk assessment process



Source: Risk assessment for safety and health at work in the process of geological research

4. LEGAL REGULATION THAT TREATS THE PROBLEM OF JOB

Safety at work is as old as human activity itself, but it began to be legally regulated only with the advent of the industrial revolution, when injuries and illnesses at work became very frequent and numerous. Safety and health at work with our legislation is conceived as an integral part of the organization of work and the work process and on that basis it is provided for every worker and for every useful work, regardless of the type and complexity of the work, which is in accordance with the constitutional principle of the right of every employee to protection at work. The introduction of the principle of application of preventive measures is of essential importance and implies the active undertaking of all measures in order to eliminate the risk of possible injuries or occurrence of diseases at work, ie work-related diseases. (Guidelines for creating a risk assessment at a workplace, 2021, p.47). The choice of preventive measures is determined by the employer based on the estimated risk, the determined priority and the respect of the principles. Preventive measures are applied in all stages of the work process. This includes the production processes, as well as the use and maintenance of the means of work, means and equipment for personal

protection at the workplace and from dangerous substances. If the risk assessment and potential hazards in workplaces where there are increased risks are ignored, it would directly threaten the safety and health of workers.

5. EXAMPLE OF RISK ASSESSMENT

Using a method for describing the operator of a hydraulic well operator and the corresponding checklists are in accordance with the Law and the Regulation on the method and procedure for risk assessment in the workplace and the working environment. The paper presents an analysis of the most significant hazards and damages that occur or may occur in the drilling process, for example for the job of a hydraulic drill operator. The existing methodological approach, with the application of the KINNEY method, has been verified and proven in practice, the model for assessing the subject risk for health and safety at work.

Figure 2. Identified hazards and pitfalls for the position of operator of a production drill on mine

Code	Subcode	Hazards and harms	Identified hazards	
1. Mechanical hazards that occur with the use of work equipment			Have	Don't have
01	1.2	Insufficient safety due to moving parts	√	
03	3.2	Movement of working machines or vehicles		×
2. Dangers that occur in connection with the characteristics of the workplace				
08	8.1	Dangers that arise in connection with the characteristics of the workplace, dangerous surfaces (sharp edges, protruding parts, etc.)		×
10	9.1	Working in a narrow, limited and dangerous space		×
13	10.1	Possibility of slipping or tripping (wet or slippery surfaces)	√	
14	11.1	Physical instability in the workplace		×
Physical harms				
32	32.1	Noise	√	
33	33.1	Mechanical vibrations		×
38	38.1	Harmful effects of microclimatic factors (high temperature, low temperature, humidity, speed of air flow)	√	
4. Damages resulting from mental and psychophysiological efforts				
47	47.2	Efforts or physical demands of manual load transfer		×
48	48.2	Unphysiological position of the body	√	
50	50.1	Strains when doing certain things that cause psychological strain - stress		×
5. Damages related to the organization of work				
53	53.2	Work in shifts	√	

Source: Guidelines for creating a risk assessment at a workplace, 2021

6. CONCLUSION

With a detailed identification and analysis of hazards and harms, for the driller's workplace during geological exploration drilling, it can be concluded that the KINNEY method and the methodological procedure of risk assessment have fulfilled their purpose and have given results on the basis of which it can be established control mechanisms of the assessed risks.,

The optimized risk assessment model is based on the KINNEY method and has been practically applied and verified by supervision in the process of conducting geological exploration drilling, whereby an efficient and effective system for managing health and safety at work has been established in accordance with ISO 45001:2018.

It is worth noting that there is an increased risk during geological exploratory drilling, but it can also be managed by implementing the planned measures to establish control over the increased risk.

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